ECOLOGY CENTER

ENVIRONMENT MICHIGAN RESEARCH & POLICY CENTER

Summary of Key Findings

Moving Michigan Beyond Oil

Fueling Our Transportation While Growing Jobs and Reducing Global Warming Pollution

Problem: Michigan's petroleum addiction adds to global warming pollution while draining the state's economy

- New vehicles must improve fuel economy 40 to 50% by 2020. However, our political leaders have not required significant emission reductions from the fuels our vehicles use, running the risk that **overall greenhouse gas emissions from transportation could increase.**
- Global warming pollution is predicted to increase average temperatures (approx. 5-10°F). Thus, without further action, Michigan faces an overall drier climate with increased extreme weather events. This will result in lower lake levels, increased invasive species vulnerability, and increased pressure to overuse Great Lakes water.[1]
- More than **$14 billion per year currently leaves Michigan's economy** for petroleum, natural gas, and coal imports, leading to further loss of economic activity and jobs in Michigan's troubled economy.

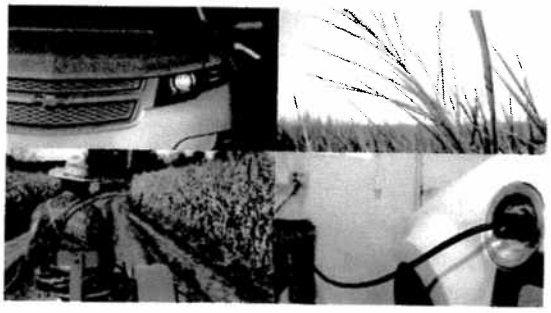
Analysis: Not all fuels are equal.

In evaluating alternative transportation fuels that could help solve our state's petroleum addiction, it is clear that **fuels have different environmental and economic strengths and drawbacks.** We compared fuels based on their lifecycle global warming emissions (from production to use), air and water pollution, deforestation and land use impacts, food crop displacement, oil replacement, and cost. After a detailed analysis of costs and benefits, the report gives a "green light" to electricity and cellulosic biofuels to fuel Michigan's transportation needs, and a "red light" to coal-to-liquid schemes. Receiving the "yellow light" are corn-based ethanol, biodiesel, natural gas and hydrogen, which all have significant environmental and economic potential yet also have significant drawbacks and risks.

Solution: Implement policies that promote cleaner, more sustainable, and job-creating transportation fuels.

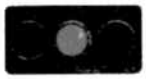
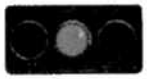
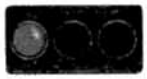
Michigan has an opportunity to become a **leader in developing alternatives to petroleum transportation fuels** by implementing innovative new policies that can grow our economy, while also reducing global warming pollution and ecological damage. Redirecting even a portion of the approximately $14 billion currently leaving Michigan's economy would likely **deliver significant economic benefits.**

The best policy to ensure increasing demand for home-grown fuels with lower life cycle global warming emissions is a Low Carbon Fuel Standard (or "LCFS"), which uses a market-driven approach to encourage low-cost and consumer-responsive fuel choices that help meet the goal. Michigan should enact an LCFS and other complementary policies that encourage additional fueling infrastructure, R & D, and the development of sustainably-grown feedstocks. Full report available at http://www.ecocenter.org/documents/MovingBeyondOil.pdf



1 D.R. Easterling and T.R. Karl, "Potential Consequences of Climate Variability and Change for the Midwestern United States," *Report for the U.S. Global Change Research Program*, Cambridge University Press, 2001 (http://www.usgcrp.gov/usgcrp/nacc/midwest.htm, 6 June 2009).

Comparison of Alternative Fuels for Breaking Michigan's Oil Addiction

Corn Ethanol 	+ Domestically produced + Beneficial co-products + Potential for lower carbon/energy footprint	– Land use change; competition with food crops – Lower energy content (mpg) than gasoline – Significant inputs (fertilizer, water) needed for high yields
Cellulosic Ethanol 	+ Fewer GHG emissions + Potential to restore abandoned/marginal cropland + *Opportunity:* Mascoma Corp. has made major investment in Upper Peninsula	– Not yet available at commercial scale – Lower energy content than gasoline
Biodiesel 	+ Fewer GHG emissions, less air pollution	– Feedstock crops conflict with other land uses – Less energy per acre than ethanol crops – Limited supply
Electricity 	+ Electric motors are more efficient than internal combustion engines (lower GHG emissions) + Charging with renewable sources results in extremely low emissions + *Opportunity:* Michigan can become a key player in advanced battery and wind turbine component manufacturing; several key battery companies have already invested here	– Re-charging infrastructure required – Widespread use of electric vehicles (and dirty electricity sources) could lead to increased air pollution
Natural gas 	+ Decreased emissions, GHG pollution + Use of biogas (produced from farms, wastewater, etc.) has potential for decreasing GHG emissions + *Opportunity:* City of Flint/Swedish Biogas Partnership	– Drilling creates sediment, toxic pollution – Pipelines for transporting natural gas cut through ecosystems, fragment habitats – Increased particulate matter emissions – Insufficient refueling infrastructure
Hydrogen 	+ Domestically produced + Reduced petroleum consumption	– Not yet commercially feasible – Electrolysis requires large amounts of electricity (increased emissions)
Coal-to- 	+ Domestically produced	– High GHG, air, & water pollution – Irreversible land use impacts – Mining destroys habitat, pollutes land – Even with CCS, lifecycle emissions 4-8% greater than gasoline

Excerpted from: "Moving Michigan Beyond Oil," available at http://www.ecocenter.org/documents/MovingBeyondOil.pdf

Written by: Ecology Center; Frontier Group; Environment Michigan Research & Policy Center; and Environment America Research & Policy Center

ECOLOGY CENTER

For More Information: Contact Monica Patel • monica@ecocenter.org • 734.761.3186 (ext. 118)
or visit http:www.ecocenter.org/cleancar/cleanenergy.php

ReEnergize MICHIGAN!

Fact Sheet

The Low Carbon Fuel Standard

Michigan's Path to Growing Green Transportation Jobs

What is a Low Carbon Fuel Standard (LCFS)?

A Low Carbon Fuel Standard (LCFS) requires fuel providers to meet **a declining standard for greenhouse gas (GHG) emissions.** This technology-neutral, performance-based approach does not dictate the mix of fuels or the quantities that fuel providers are obligated to deliver. Among their many options to ensure their sales-weighted average meets the standard, providers could purchase and blend low-carbon biofuels (e.g., cellulosic ethanol) into gasoline products, or purchase credits from electric utilities supplying electricity for low-carbon plug-in hybrid electric vehicles. The LCFS **allows the market to determine the least-cost and most consumer-responsive outcome** for the fuel mix while ensuring decreasing GHG emissions.

Why does Michigan need an LCFS?

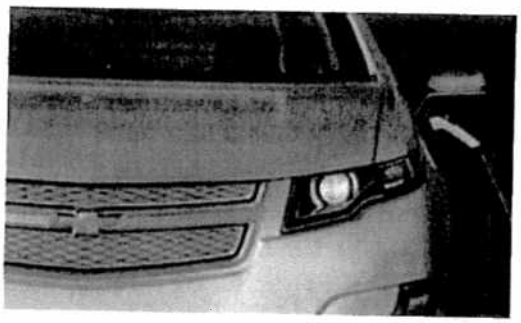
As states look to reduce petroleum dependency and provide new economic opportunities, it is important we ensure that advanced fuels are developed in a sustainable manner. **The lowest carbon, lowest impact "fuel" is electricity. Some biofuels may actually result in greater releases of GHG emissions than gasoline.**[1] In general, advanced biofuels made from cellulosic feedstocks (e.g. perennial grasses and woody biomass) are less carbon-intensive to grow and produce and have fewer environmental impacts than fuels made from corn. A policy framework is therefore needed that ensures both—that all fuels are produced sustainably and that the amount of greenhouse gases in our transportation fuels declines over time.

LCFS Benefits for Michigan

An LCFS is an important part of Michigan's fuels policy because it will help:

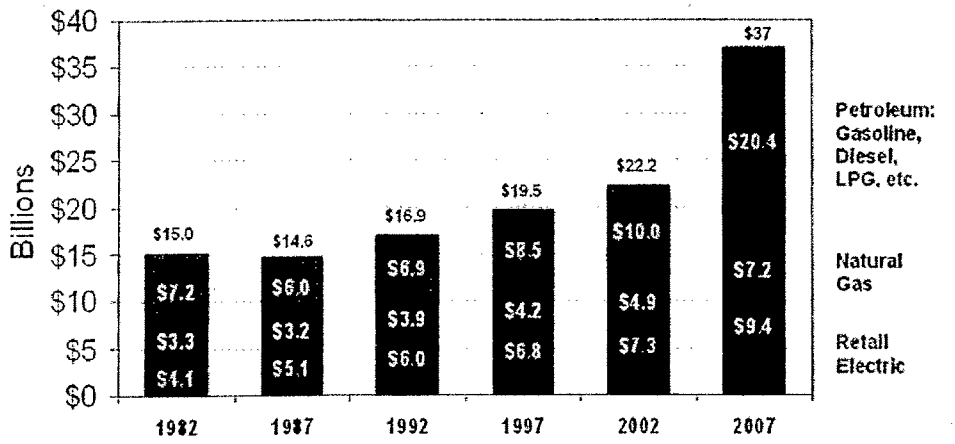
- **Reduce Michigan's vulnerability to oil supply constraints** and diversify our energy supply
- **Leverage existing manufacturing incentives** for advanced batteries and advanced cellulosic fuel.
- **Create economic opportunities** for renewable fuel producers who can lead the transition to advanced, low-carbon fuels
- Support the auto industry's development of **low-carbon electric vehicle technologies** (such as GM's plug-in electric Chevy Volt), and
- Ease the transition to a carbon-constrained economy.

Michigan has an opportunity to become a leader in developing alternatives to petroleum transportation fuels by growing our economy and reducing global warming pollution and ecological damage.



The Chevy Volt: GM's flex-fuel hybrid electric vehicle could be in production as early as 2010. The Volt has led to a new $25 million battery lab in Warren, Michigan.

Michigan Total Energy Expenditures



Source: Michigan Public Service Commission, Michigan Energy Overview, September 2008

LCFS Support

The Michigan Climate Action Council (MCAC) and the Renewable Fuels Commission (RFC) have both supported the adoption of a state LCFS. Both groups have highlighted the need for a low-carbon fuels strategy in their final recommendations to Michigan's leaders.

Though an LCFS will provide the biggest driver for the production and use of low-carbon fuels in Michigan, additional policies will also help ease the transition to lower-carbon fuels. Several of these policies are also part of the RFC's final recommendations and MCAC's final Climate Action Plan:

1. Provide "green retailer" incentives for the sale of low-carbon fuels
2. Support research and development for low-carbon fuels
3. Encourage production of sustainable feedstocks

LCFS in Other States

- California recently adopted a requirement for a 10% reduction in the carbon intensity of transportation fuels by 2020
- Several Midwest states (e.g., IL, WI and MN) have recommended an LCFS as part of their climate action plans, as have other states around the country
- The Midwestern Governor's Association is initiating the development of a low-carbon fuels policy as part of its Energy Security and Climate Stewardship Initiative

Full Life-cycle Analysis

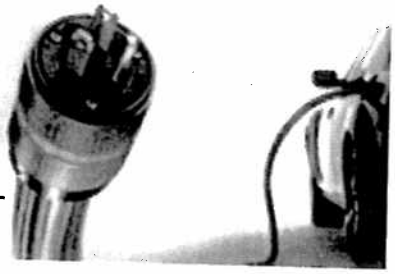
The GHG-intensity of fuels must be determined for the entire life cycle of the fuel, including land use changes that result from its production, for this approach to be effective.

A comprehensive life-cycle evaluation includes global warming emissions from the following steps:

- Production and extraction
- Transportation to the refinery
- Refining or conversion
- Transportation of the fuel to market
- Consumption of the fuel in the vehicle

1. U.S. Environmental Protection Agency, Greenhouse Gas Impacts of Expanded Renewable and Alternative Fuels Use, EPA420-F-07-035, April 2007. Available at http://www.epa.gov/oms/renewablefuels/420f07035.htm (accessed May 2, 2008).

ECOLOGY CENTER



Frequently Asked Questions

FAQs about HB 5383

HB5383: Proposes to create a Michigan Low-Carbon Fuel Standard (LCFS)

What is a Low Carbon Fuel Standard (LCFS)?

A Low Carbon Fuel Standard (LCFS) sets the bar for our vehicles' fuels to come from cleaner, less polluting sources. It is similar to a Renewable Portfolio Standard (RPS) for the transportation fuels sector -- in other words, **"an RPS on Wheels."** In HB 5383, an LCFS would require oil refineries and fuel blenders to lower the greenhouse gas emissions intensity of the fuels they sell by **10% by 2020.**

How does an LCFS help stimulate job growth in the clean energy industry in Michigan?

An LCFS essentially stimulates demand for alternative clean fuels. While Michigan has become a leader in providing incentives for the production of new technologies (e.g., advanced batteries used in plug-in hybrids and advanced biofuel crops), **we have not helped ensure that there will be a market for them.** An LCFS creates this demand by requiring that a growing percentage of these alternatives be sold each year, similar to the way an RPS requires an increasing percentage of renewable energy be used in the electricity sector. As we have seen with the RPS, creating this demand in the state is critical to getting more clean energy businesses to set up shop and stay here. It should be noted that with an LCFS, we measure "carbon-intensity" because that ensures that we are encouraging the least carbon-polluting alternatives and helping prepare Michigan to be an economic leader in a carbon-constrained world.

What impact will an LCFS have on Michigan's economy and fuel prices?

Despite the claims of the oil industry, **an LCFS may help decrease fuel prices** by encouraging faster development of alternative fuels that can provide a buffer against higher petroleum prices. Additionally, an LCFS would help us to keep more of our dollars here in Michigan, while multiplying the economic benefits within our state. Currently, **we send over $14 billion to other states and countries to import petroleum.** By encouraging the development of alternative fuels grown or produced in Michigan - such as advanced biofuels or electricity for plug-in electric vehicles -an LCFS will raise incomes and create new jobs.

A macroeconomic analysis of Michigan's Climate Action Plan, released by researchers from Michigan State University, the University of Southern California and the Center for Climate Strategies in January 2010, indicated that an LCFS would create over **11,000 jobs and have a direct net cumulative savings for the gross state product (GSP) of about $3 billion between 2010 and 2025.** These findings provide added credibility to our arguments that an LCFS is good for Michigan's economy and for reducing climate change.

How will HB 5383 impact the biofuels industry?

An LCFS **does not pick winners and losers,** but rather establishes performance standards and lets the market respond with the lowest cost options for meeting them. That said, today's biofuels (primarily corn ethanol and biodiesel) compare somewhat favorably to gasoline in terms of life cycle carbon emissions, but not as favorable as other advanced fuels like cellulosic ethanol and electricity from advanced batteries. An LCFS will therefore **encourage the current industry to improve its carbon footprint over time** in order to continue competing in the marketplace—a strategy the industry has already embraced.

As home to two of the country's leading next generation biofuels projects as well as auto companies which have invested the most in the production of "flex-fuel vehicles," **Michigan has much to gain from the use of sustainably harvested, next-generation biofuels.** An LCFS provides strong incentives for doing biofuels right by reducing carbon intensity and related environmental issues. Our diverse agricultural sector and unique technological capability as well as the resources we've already put into attracting cellulosic ethanol development ensure that Michigan will benefit from increased use of home-grown fuels.

Should a Low-Carbon Fuel Standard be a federal policy?

Yes, a federal policy would certainly have its advantages, but it would not ensure that Michigan becomes a leader in developing low-carbon fuels, or that Michigan citizens would enjoy the benefits of the new job opportunities likely created by developing its own state policy. By taking policy leadership, Michigan can both take advantage of new opportunities for growing its economy, as well as put itself in the driver's seat in the event that a federal policy is developed. Waiting for Congress to act is not a sound economic development and environmental protection strategy for Michigan.

How is an LCFS different from the federal Renewable Fuel Standard (RFS)?

The federal RFS requires the fuels industry to sell an increasing quantity of new renewable fuels each year, but does not set targets for greenhouse gas (GHG) emissions from all transportation fuels. This means that GHG emissions could still actually rise, for example due to increased use of high-carbon, petroleum-based fuels (like oil sands) or coal-to-liquid based fuels. The federal Renewable Fuel Standard also does not encourage low-carbon alternatives like electricity, which may have the most potential for both reducing ghg emissions and revitalizing our advanced battery and automotive industries.

How is an LCFS different from federal CAFE (fuel efficiency) standards?

HB 5383 does not regulate the automobile industry or emissions from vehicles. While fuel efficiency standards ensure that cars use less fuel, an LCFS ensures that the fuels that go into vehicles have fewer emissions. Both are needed in order to ensure reductions from the transportation sector. The point of regulation in an LCFS is oil refineries and fuel blenders.

Will an LCFS stop tar sands coming from Canada?

No, contrary to some claims made by the petroleum industry, an LCFS will not "ban" fuels from Canada that are derived from the extraction of tar sands. An LCFS will, however, make these higher-carbon fuels less desirable if companies do not develop methods for reducing the greenhouse gas emissions associated with their production. An LCFS may also make it necessary for fuel providers to sell additional low-carbon fuels in order to offset any increase in carbon-intensity that would be associated with these more polluting fuels.

What about possible negative environmental impacts from biofuels development?

New feedstocks for biofuels will need to be grown, harvested and produced in a sustainable manner. While an LCFS ensures the reduction of greenhouse gas emissions associated with these new feedstocks and processes, additional safeguards may be needed to ensure that other best practices are used. The legislation being proposed would create a new "sustainability advisory committee" that would make recommendations to the relevant agencies on such needed policies.

Who is supporting an LCFS?

A variety of public bodies and private stakeholders in Michigan have supported the idea of an LCFS. Most recently, the Michigan Climate Action Council, which included many industry stakeholders, included an LCFS in its recommendations for reducing greenhouse gas emissions in the state. An LCFS was determined to be the single best policy for reducing emissions in the transportation sector, and 7th overall, resulting in emissions reductions of 53 million metric tons of CO2 by 2025. The Michigan Renewable Fuels Commission has also supported a low-carbon fuels policy.

Outside of Michigan, an LCFS has recently been adopted by the California Air Resources Board, and has been recommended in many other state climate plans—including several in the Midwest (IL, IA, MN and WI). The Midwestern Governors' Association (MGA) has also endorsed an LCFS that reduces carbon intensity by 10% over 10 years, and is convening an advisory group to develop a common regional framework for state LCFS policy throughout the region.

Passing an LCFS is a core part of the agenda of the ReEnergize Michigan campaign, which consists of dozens of leading organizations advocating for clean energy policies that create jobs for Michiganders.

ECOLOGY CENTER

Prepared by: Ecology Center; Environment Michigan Research & Policy Center
For More Information: Contact Monica Patel • monica@ecocenter.org • 734.761.3186 (ext. 118)
or visit www.ecocenter.org/cleancar/cleanenergy.php